PART II

PRINCIPLES FOR THE RATIONAL CONSTRUCTION OF FURNACES

THE problems of furnace construction will be solved when it is possible to regulate the temperature within the enclosure of their heating chambers according to the requirements of the material to be heated. The gas passes from the firebox into the heating chamber without having completed combustion. The first problem to be solved, therefore, is to afford space in the heating chamber within which combustion may be completed. With a short concentrated core of burning gases the highest temperatures are obtained. At other times, according to the material and the method by which it must be heated, it is necessary to prevent the formation of a jet of burning gases and to provide a general combustion of the gases throughout the heating chamber *(a long, soft flame).*

The second problem is in the heating, by means of the hot gases obtained, of those objects which have been placed in the heating chamber of the furnace for this purpose.

For the time being, the first of these problems will be neglected, and this portion of the present work will be devoted exclusively to the solution of the second problem, which may be more definitely stated as follows: In what manner may the hot gases be circulated so that they will, in the most perfect manner, surround the objects being heated and be carried out of the heating chamber, in order that their place may be taken by hotter gases? In what manner may the heating chamber be adapted to obtain such a circulation of the hot gases?

The solution of this second problem is very simple, but in spite of its simplicity it is very poorly understood by practicing furnace designers. Upon the following pages are collected a number of designs of furnaces which

have been operated or are